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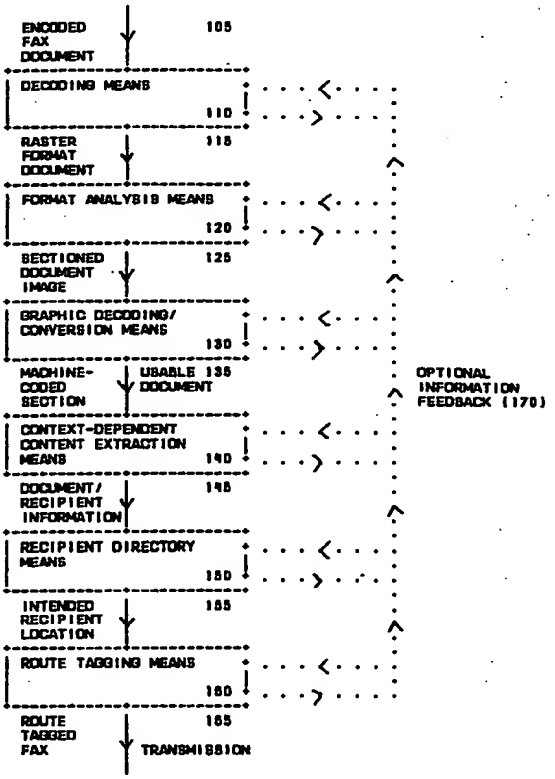
(54) Title: A METHOD FOR ROUTING FAX TRANSMISSIONS

(57) Abstract

A method is described whereby a machine-readable graphic is incorporated into the cover sheet of a scanned FAX transmission, which grapic permits the automated routing of the transmission. Further, a network of Public FAX stations is described which employ such an automated routing technique, in particular for return FAXs.



FAX TRANSMISSION ROUTING SYSTEM

* See back of page

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A METHOD FOR ROUTING FAX TRANSMISSIONS

TECHNICAL FIELD

The instant invention relates to a method for routing photo-facsimile (FAX) transmissions over a computerized communications network.

BACKGROUND

FAXing (from photo-facsimile transmission, also called tele-copying) is becoming almost as ubiquitous as telephoning; an essential part of doing business. Companies provide their departments with "industrial strength" full-featured FAXs; individuals and small businesses use lower cost "personal" FAXs; computers are being outfitted with PC-FAX boards; FAX services are springing up to provide automated and broadcast FAXing; almost every copy shop (and many hotel desks) has a FAX where one may

send or receive FAXs at exorbitant rates and at the copy shop's convenience; and there are even portable FAXs that may be moved from location to location for use with any available phone.

What does not exist is a Public FAX^{tm} - the equivalent of the pay telephone - a convenient, 24-hour, affordable way to send or receive FAXs when out of the office or on the road, or for use by non-FAX-equipped parties.

A major problem that prevents the implementation of such a network is that, while standard scanning-FAX transmissions may be sent to a particular phone number/location, they cannot be tagged for a particular individual at that location, or for a particular individual at an unspecified location on a network. The present invention relates to a method for automated routing of FAX transmissions.

The present invention also relates to a networked system of automated FAX stations, suitable for unattended operation in public spaces, which may be conveniently used by the general public for sending and receiving FAX documents.

Each Public FAX Station is more than a simple FAX machine. It incorporates a microcomputer and is a gateway to a communications network that can store and forward FAX or electronic mail messages from/to Public FAXs, standard FAXs, PCs and PC-FAXs, and will interface with other communications networks. The same network will be accessible to subscribers with FAXs, PCs, PC-FAXs, Telex, etc. and the Public FAX Stations would be accessible to those subscribers, when out of the office (much as pay phones are used by business people on the road), as well as to the general public.

Using such a system for business will allow, for exapmle:

Salesmen to immediately send complex order forms back to the office, after each sales call, without the time, inconvenience or

inaccuracies of finding the right person and reading the order over the phone;

Maintenance or inspecting engineers to receive complex itinerary and technical information without returning to the office; and

Traveling executives to receive and return voluminous written information from/to the office, even after closing time, at the airport or hotel.

And, the general public will, no doubt, find many ways to make such a system an indispensable part of every day life, just as the public phone has become.

PRIOR ART

Very recent advances in computer technology, and in desk-top personal computer technology in particular, are changing the way FAX is used.

FAX is itself a technology that has only recently become common and widespread, due to significantly lower cost equipment. It allows for the scanning and transmission, over a voice-grade telephone line, of documents which are then decoded and printed by the receiving section of a similar device.

Many individuals and businesses of all sizes now possess FAX machines, and many photocopying shops now provide both sending and receiving services to the non-equipped user. Having reached an installed "critical mass", the FAXing of letters, contracts, advertising flyers, orders and legal documents, etc. is now de rigueur (if not necessarily welcome) as a business accessory.

Originally, the advantage of FAX was that it could send graphic information (e.g., drawings, handwriting and signatures) as there were already technologies, like TELEX and other electronic mail services, which could send text "instantly". Even when (as with most business documents these days) the document has been created using a computer wordprocessor, images of the printed documents are sent by FAX instead of sending the typewritten data file, which would be quicker and less expensive. This is because, as FAX has become very widespread and accessible, these other technologies do not now offer a comparable user base and, therefore, FAX has become the common way to send typewritten matter. Further, the 8.5" x 11" printed page is a "data standard" that is easy to conform to, while communicating between different computers and wordprocessors can be problematic.

The "paper document transmission advantage" of FAX is now a problem. FAXing requires that a paper copy of every page of every document be produced and, further, that each page be fed into the FAX machine, multiple times for multiple transmissions. While computers, wordprocessors and the like are moving businesses toward office automation and the "paperless society", FAXing requires paper and mechanical work. A further problem is that, while businesses move toward more sophisticated looking documents (by using laser printing, desk-top publishing and the like), the delivered quality of documents that have been scanned, transmitted and printed at the local FAX is often quite poor.

A new technology, alluded to at the start of this document, has been developed to address these problems. PC-FAX cards are now available which can be installed in standard desk-top personal computers to provide the electronics for FAX transmission and reception, but not scanning and printing. When integrated with a document scanner and suitable printer, the entire system can emulate a standard FAX machine.

However, the more interesting use of these devices is for the automated and paperless FAX transmission of computerized or wordprocessed

documents. These PC-FAX cards (with appropriate software) have the capability of taking a document file, where letters are represented by digital codes, and constructing a FAX compatible image of the document, by drawing individual letters as patterns of pixels (picture elements) in computer memory. This image of the document may then be transmitted, just as if it had been created by scanning a printed paper version of the document. Incoming FAX images are captured by the PC-FAX board and stored in the computer for viewing on the video screen or printing on a graphic-capable printer.

The great advantage is that, this allows for the automatic and unattended FAXing of wordprocessed documents. Because of the programability inherent in PCs, FAX transmissions may be queued and scheduled for reasons of convenience or to take advantage of discount phone rates, and busy numbers may be automatically re-tried. Also, the same document may be automatically transmitted to a number of FAXs (in a procedure known as broadcast FAX) saving tremendous time and effort when compared to broadcast FAXing by conventional means.

In addition, FAXs provide a tremendous customer base to which high quality printed material may be delivered. However, in the scanning of original documents, the quality may suffer substantially. For computer generated material, the quality of such documents as received (if produced by the proper PC-FAX software) is superior to the quality of the same document if it were first printed and scanned/transmitted/re-printed by conventional FAX means.

Services are now being established to provide automated delivery of computerized messages and documents (first sent to the service from the customer by modem) to any FAX machine or many FAX machines in broadcast mode. Such services prove advantageous in that they:

provide FAX capability to those who do not have FAX machines or PC-FAX equipment;

permit automated and programmable transmissions from PCs;

provide better delivered document quality than if the same documents were printed and FAXed conventionally; and

provide easy broadcast FAX, and quick broadcast FAX due to the fact that many PC-FAX boards and phone lines are used simultaneously by such service bureaus.

PC-FAX boards, and the services employing fleets of such boards, may also receive FAX transmissions. This creates a new problem which is the substance of the present disclosure.

SCOPE OF INVENTION

The instant invention relates to:

1. The construction of automated FAX stations, suitable for unattended operation in public spaces;

2. The integration of these machines into a store and forward communications network that will permit the transmission and reception of FAXs to/from any of a number of locations and also, in a well defined manner, interface to the large user base of standard FAX machines, PC-FAXs and FAX service bureaus; and

3. The incorporation of routing and identification information into FAX transmissions, which will permit automatic document tracking and routing, flexible delivery, and security and payment schemes, when implementing this, or any other, communications network.

STATEMENT OF PROBLEM

When FAX machine standards were being developed, machine-readable addressee-identification information was not anticipated. Incoming FAXs to a particular phone number were generally directed to a single physical machine, to be printed and distributed by human hand.

However, PC-FAX systems and services now accept incoming FAXs on a network, for many individuals. The problem then is that, while PC-FAX systems and services provide completely automated transmission of text files, incoming FAXs must still be handled manually. This is because FAX text is in graphic form, not digitally coded form, and therefore cannot be directly read by computer. Computer software, even with artificial intelligence, does not yet exist that can handle general text in arbitrary contexts. Therefore, the machine cannot reasonably determine for whom the FAX is intended, by accessing the contents of the FAX image.

Not even human intelligence can handle the problem easily. Particularly for service bureaus or in large companies receiving FAXs for many individuals, it takes some effort to determine to whom the FAX is to be directed. It is therefore almost universal that FAX transmissions are proceeded by a cover sheet, which clearly spells out to whom the FAX is going, from whom it comes, subject of the document, the return FAX number, etc.

Unfortunately, as described above, the computer cannot reasonably extract such information from a FAX image of the cover sheet. Therefore, at PC-FAX service bureaus, an image of the FAX, or at least the cover sheet, must be brought up on a computer screen, read by an operator, and tagged with a machine readable digital code for computer routing and delivery.

Because of the economics of human vs. machine labor, incoming FAX is therefore much more expensive, due to even this small amount of human intervention. Further, having a person other than for whom the FAX was

intended read the incoming FAX, adds a potential security problem for sensitive documents.

The invention described below relates to the process of automatically routing and delivering FAX transmissions at the receiving end.

Similarly, the implementation of a network of fully automated Public FAX stations is not now practical because, although anyone could transmit a FAX from such an automated station, such a Public FAX station could not now determine in an automated fashion for whom an incoming FAX was intended. An embodiment of the automated FAX routing process will permit the fully automated operation of such a Public FAX station for both transmission and reception.

DETAILED DISCRIPTION

As described above, the received image of a FAX will generally contain information about for whom it is intended. But, even if this information is clearly organized on a cover sheet and easily identified by a human, the nonspecific graphic nature of this information makes it unsuitable for extraction by the kinds of computers and software in common commercial use at this time.

Rather than relying on advances to computer and software technology, the present invention relates to techniques for specifying and restricting the routing and delivery information to a format that can be utilized by the current technology.

One embodiment employs an approach which strongly restricts the form of this information so that it may be extracted by the computer even if its position is unknown. Utilizing a very strict form standard (such as the Universal Product Code (UPC) bar-code) numeric or other types of data may be conveyed in graphic form, and with little or no restriction on

position, but may still be machine-readable with known software techniques. (See Figure 1.)

Therefore, if a bar-code label were applied to or printed on the cover sheet of a FAX, prior to transmission, it would be within the capabilities of current technology for a computer to automatically "scan" an incoming FAX image for routing information. By scanning rows and columns, the distinctive bar-code-type pattern would be recognizable to the computer in either vertical or horizontal (or even skewed) position. Supermarket laser scanning systems take advantage of this technique. The pattern is than scanned forwards and backwards, looking for a "start pattern" to determine polarity. Finally, information patterns are recognized and standard digital codes (e.g., ASCII text codes) are constructed for further standard computer interpretation and action.

The UPC bar-code is only used here as an example. Any easily machine-recognizable/readable graphic coding structure may be used. In particular, sinere as an example. Any easily machine-recognizable/readable graphic coding structure may be used. In particular, since the vast majority of incoming FAXs to a service bureau will be received in response to a FAX delivered by the service, the following technique may be used with any pattern the service chooses to establish as their standard.

When FAXs are delivered by the service, a cover sheet is usually sent (or certainly can be) just prior to the document. The cover sheet usually identifies the service, and certainly identifies the sender and intended recipient. In the preferred embodiment, a bar-code-like graphic would be embedded into the cover sheet, along with a message to, "Please Re-Use This Cover Sheet First When Responding to This FAX". Also, a small box would be provided to be optionally darkened by pencil or pen that would indicate that, "Please check this box for human intervention. Otherwise, the return FAX will be automatically delivered by computer to the original sending party." Space would be provided for the re-sender to put his "cover sheet" information, including special instructions, if this

"intervention" box had been selected.

All incoming FAXs would then be scanned by the network or service computer to locate and extract information from the returned "bar-code". The bar-code would either contain an identification of who sent the original correspondence (and to whom the response is therefore presumably intended) or would uniquely identify the correspondence itself with a serial number. If the correspondence was identified, the computer would then look up who sent that document and automatically route the response to that person, or some other person to whom returns were to be routed. Incoming FAXs without bar-codes, or those which had been selected for "human intervention", would be routed "by hand" as before.

This method is quicker (for the humans involved, at least) and less expensive than having all incoming FAXs scanned by human eyes for routing. Further, it is more secure in that the incoming messages are untouched and unseen by anyone but the recipient.

If a transaction or document number is represented in the bar code or other machine-readable graphic, it can functions as both an address and a postage stamp (i.e., transmission authorization). Besides destination, the document/transaction number could authorize a pre-paid return, and further limit the number of returned documents, the period for valid return, the length of the returned document or other limitation. Particularly with a "broadcast FAX", each item could have a machine-readable cover sheet that specified a uniform return destination, but which also uniquely identified each recipient. In that case, each recipient might be allowed to reply (automatically or pre-paid) under unique circumstances.

In one particular embodiment the bar-code information would be pre-printed up one side and repeated down the other. In this way, the bar-code would be in an expected position and orientation whether the cover sheet were re-transmitted head first or tail first. (See Figure 1.)

Knowing, and entering via the telephone keypad, a person's telephone extension at a large company, can often get you through to that person more easily and quickly than going through the human operated switchboard. It is now fairly common to print both one's business phone number and extension on business cards. Similarly it is common to print one's FAX number on one's business cards and business letterhead. However, if that FAX number belongs to an outside service or company-wide PC-FAX network, the phone number does not convey the full information needed to specify an individual recipient.

It may soon become useful and common to print not only a FAX number, but a routing code or account number as well. That routing information or account number could be entered onto a FAX cover sheet by any of the techniques described herein. However, it would be particularly useful if the FAX extension (as well as the basic phone number for automatic dialing) were printed in machine readable (e.g., bar-code) form on the back of one's business card. In this way, giving someone your business card would not only provide the FAX phone number, but provide a machine-readable "swatch" that could be photocopied onto the corner of a FAX cover sheet for automated routing and delivery.

Similarly, such a machine-readable device could be incorporated into company letterhead. However, while it is routine for each individual to have their own business cards, companies usually have one, or very few, distinct letterheads. Therefore, while having a company-wide FAX phone number in the letterhead is practical, individual routing extensions would likely not be. It is therefore intended that one embodiment of the instant invention would consist of a pad or sheet of small bar-code printed labels that could be affixed to a letterhead, signature line, FAX cover sheet. Someone could then send an automatically routable FAX by photocopying the bar-code pattern from a previously received letter onto the FAX cover sheet. Alternately, a supply of original return-labels could be supplied to someone with whom it was expected to be exchanging a significant number of FAXs.

individual sets of bar-code labels would be printed (most likely with the individuals name as well) for each employee on a company-wide network, or for each customer account subscribing to a service bureau. Such printing may be done on an individual demand basis since quick, custom bar-code printing may now be done on desk-top computer systems equipped with the proper printer and software.

In the previous example, the form of the graphic code was tightly specified and, thus, its position was virtually unrestricted. At the other end of the scale is a technique where the form of the graphic is trivial, and may even be hand drawn, but where position is everything. Particularly useful where FAXs will be coming in unbidden, rather than in direct response to a previous FAX, a pre-printed cover sheet may distributed to a community of users expected to send scanned FAXs via a computer receiving service. This sheet would include a section consisting of rows (or columns) of numbers and/or letters. Like in standardized test answer sheets, one number or letter is darkened (by hand, with a pen or pencil) in each row, and the rows taken in order would indicate the name or account number of the addressee. Such a matrix is easily handled by currently known computer scanning techniques, but the location of the matrix, and position of the marks placed thereon, must be strictly specified. Alternately, for computer generated FAX transmissions, the filled-in matrix may be easily synthesized in the same manner that the text of the document would be.

A midway alternative, that places rigid restrictions on neither position nor on graphic form, would work as follows. Computer software now exists that can read optically scanned characters (called Optical Character Recognition or OCR) so long as the letters are clear, of proper size and spacing, and printed in one of a few, well-understood type faces.

By adopting a fairly loose standard for addressee routing information, a corporate network, PC-FAX service or the entire industry, can permit available, inexpensive computer software to decode the intended destination and automatically route incoming FAXs. An example of such a

standard would be:

reserve the upper-left corner box 2" wide by 1" high for addressee information;
put nothing else within this area;
print in courier or pica type;
print in all capitals;
print at 10 or 12 pitch;
print a top line consisting of "DESTINATION"; and
print a second line containing the addressee's name or account number, as required at the receiving end.

Such information could be typed or computer printed, onto a separate cover sheet or at the top of the document. Or, it could be integrated directly into a computer generated FAX image. [It is even possible [although not yet widely available] to hand write such information for reading by a handwriting recognition program. However, this requires that the writing be very carefully printed, spaced and sized, onto a form with guide boxes provided for each letter, and is still not entirely reliable.]

EMBODIMENT IN A PUBLIC FAX STATION

With respect to the problem of constructing a suitable public-space FAX station, many of the system components are now in use or adaptable from other commercial devices, and the disclosure will direct one who is skilled in computer system integration to the appropriate component technologies. However, the particular juxtaposition of the components, and the use to which they are being applied in the instant invention, is novel in many respects.

The Public FAX Station will comprise system components borrowed from the following existing devices:

telephone;
microcomputer;
video display;
optional touch screen;
credit/bank card reader;
computer or FAX document scanner;
computer or FAX document printer;
FAX machine or PC-FAX encoding/decoding electronics;
paper feeding mechanism from photocopier or laser printer;
ruggedized keypad/keyboard and housing from a bank Automatic Teller Machine [ATM].

The Public FAX Station will resemble a bank ATM in that it will comprise a keypad/board, video/touch screen, document drop, document disgorger, card reader and telephone handset. All these components will be integrated into a ruggedized, vandal-resistant housing, suitable for unattended operation in a public space such as an airport, bus depot or train station, hotel or office building lobby, or even outside, in a stand alone booth or projecting from a building wall.

Normally, the machanisms would all be enclosed in a rugged housing; unaccessible except for the keypad/board, video screen and telephone handset. The credit card and documents would be inserted and disgorged by tight slides or through double trap doors. For added security, these exposed components and access ports (except card reader) would also be unaccessible, behind metal slide(s), and would only open for access after a valid credit card is inserted into (and held hostage by) the machine.

The operation and general construction of the Public FAX Stations and the operation and general organization of the Public FAX Network will be made clear from the following narrative description of how the system will be used.

In General:

Although the Public FAX Station is, in some ways, analogous to the public pay phone, most embodiments will not accept cash. Therefore, the first thing that a user will do is to insert a major credit card or bank ATM card, issued by a financial institution listed on the outside of the machine. For example, in the NYC area VISA, Master Card, American Express, Citibank and NYCE might comprise the list of approved cards.

Only after the card has been successfully read, and confirmed as valid and not stolen, will the user gain access to the machine functions. For additional security, the keypad/board, video screen, etc., may be hidden behind a metal shield until the card is verified, and the card would be retained within the machine until completion of the session.

The credit card will be used as both the method of payment and for identification for most general users. However, in some instances, Public FAX Network accounts may be established and, in that case, a FAX card and/or secret identification code could be used instead.

Once validity, identification and security have been established (by checking the credit card number over a phone line network, in the same way credit card usage is validated by stores and other commercial establishments), security shields are lifted and access to the system is permitted.

All interaction with the user is accomplished by text output printed on the video screen and, for input, a touch screen over the video screen, buttons next to the screen and registered against menu options printed on the screen, or a keypad and/or full alphanumeric keyboard, all of which are well-known technologies. (A telephone handset will connect the user to an operator in the event of trouble.)

To Send a FAX from a Public FAX Station:

To send a FAX, the document is inserted into a document feed slot. As the document is accepted by the Public FAX Station, via a variation of a photocopier paper feeding mechanism, the pages are scanned and counted. The machine queries if any pages are double sided.

It then asks where the FAX is to be delivered. Options are: to a phone where a standard FAX or PC-FAX system is located; to another specific Public FAX location, for a recipient who will have to identify himself to the system; to a specific "manned" Public FAX location (in a hotel lobby, perhaps) where an attendant will receive the FAX and deliver it to the recipient; to the Public FAX Network for later delivery to any Public FAX location, upon proper identification by the recipient; to forward to an "in-house" subscriber to this (or another) communications network; broadcasting the FAX to a number of locations; etc.

If the FAX is to be delivered to another Public FAX, the method of identification of the recipient must be specified and would include: by name and, perhaps, phone number (low level of security); by the FAX transaction number supplied by the machine (and phoned to the recipient by the sender); by a "secret" code supplied by the sender to the machine and, presumably, also known to the recipient; by the sender entering the network account number of the recipient (if the recipient has an account on this, or some other, communications network) or the credit/bank card number of the recipient.

Additional options are for: immediate delivery vs. delay for schedule or off-hour discount; how often and how long to re-try on a busy signal; whether the user will be supplying a cover sheet or wants the FAX service to provide one; whether the user wishes the recipient to be able to return a FAX to him on the Public FAX Network; whether the return will be paid for by the original user and a maximum number of return pages the user authorizes to be charged to him; etc.

If a full printed cover sheet is to be supplied by the machine, name, address or other information would be entered on a full alphanumeric keyboard, or via a picture of a keyboard on a touch screen, or (heaven forbid) by cycling through letters with up/down keys. (This Alphanumeric capability can also be used to enter brief electronic mail messages onto the network, but jotting and faxing a note would likely be more convenient.)

From the page count, delivery location/phone number, and other options, a cost is calculated and the user is asked to authorize the specific transaction.

A receipt is printed and presented to the user, including a sending transaction number and, if a return is authorized, a return transaction number. If the FAX is immediately sent, the receipt includes a delivery confirmation as well.

To Receive a FAX at a Public FAX Station:

Once access to the machine is established, the recipient must identify himself. This may simply be via the credit/bank card used for access; by name and, perhaps, phone number (low level of security); by the FAX transaction number supplied by the machine (and phoned to the recipient by the sender); by a "secret" code supplied by the sender to the machine and, presumably, also known to the recipient; by the recipient entering his network account number (if the recipient has an account on this, or some other, communications network) or his credit/bank card number, other than the one used for access.

The Public FAX Station then calls up the Public FAX message-switch network and queries whether any FAXs or other (e.g., Telex or other electronic mail variations) messages are waiting for this recipient. These are listed on the video screen and the recipient may have any or

all printed by the laser (or other type) printer which is incorporated into the Public FAX Station. Unclaimed messages are periodically purged.

Generally, the message delivery costs are pre-paid (or on account) by the sender. However, if sent collect, or if the recipient wants additional copies, his credit card or network account is billed.

Message reception is noted by the network and, at any Public FAX Station or "in-house" subscriber terminal, message status may be queried and a delivery confirmation receipt printed.

Alternately, at "manned" locations, such as in a hotel lobby, the FAX may be delivered to the location immediately and received by the attendant. It would then be put in the recipient's mailbox, left under his door, or given by the attendant to the recipient upon proper identification.

To Send a Return FAX to a Public FAX Station:

Anyone can return a FAX to the Public FAX Station Network from any FAX machine or scanning-FAX-capable system, so long as they use the cover sheet they received as a cover on their return FAX. The cover sheet delivered with a Public FAX will have imbedded in it a bar-code (or other special machine-readable information) that identifies the original transaction and, therefore, the recipient for the return message. (This is covered in detail in a related disclosure document).

Normally, FAXs consist of an image of a document, rather than a digitally coded representation of the text (e.g., ASCII). Therefore, the machines that handle FAXs have no access to digital codes that would describe the location or identity of the intended recipient. Under usual FAX-to-FAX communication this is not a problem; the one standard FAX connected to a particular phone line is the only available

receiver and the cover sheet directs a human operator to pass the document on to the intended recipient.

However, on the Public FAX Network, a recipient will request a Public FAX Station to retrieve and print his document. Without any machine-readable identification, the network could not easily find the correct document. The bar-code mentioned above gives the network computer a machine-readable way to identify the return document and to deliver and print it on demand.

Normally, the intended recipient of the return document (the sender of the original document) will have pre-authorized payment of the return FAX to his credit card or FAX account; unless the return-sender has a Public FAX account or has made other special arrangements.

To Send an Originating FAX to a Public FAX Station:

If one is set up with an "in-house" subscriber PC-FAX terminal into the Public FAX Network, a FAX may be sent to the network to be retrieved by anyone who can properly identify themselves to the queried Public FAX Station. The subscriber can be billed or the recipient can pay for a collect FAX.

The problem is how a non-subscriber can initiate a FAX to a Public FAX Station from a standard scanning FAX machine. Without the machine readable cover sheet, the network will not be able to identify the FAX. Several solutions exist:

A call to Public FAX Central with a valid credit card number will alert them to accept a FAX with a standard cover sheet and enter the cover sheet information, by keyboard, into the network computer as if read off a machine-readable cover sheet - all at extra cost, of course, due to the requirement for human intervention.

A variation would be for the Public FAX operator to FAX to the non-subscriber a specially computer prepared cover sheet to use; or for the sender to be counseled on how to create a machine-readable cover sheet according to a particular standard (as described in a related disclosure document).

Unsolicited FAXs would be refused or, with the help of a human operator, posted for "collect plus extra cost" retrieval by the recipient.

For non-"in-house"-subscribers, who wanted to routinely contact prearranged recipients from a standard FAX, the service would supply pre-printed cover sheets, or labels (or a graphic printed on the back of a business card) to affix to the cover sheet, which would automatically route the FAX to a particular user, wherever he was.

For non-subscribers, or subscribers with a Public FAX account who had FAX machines, but no PC-FAX capability, the Public Fax Network would accept FAXs based on: pre-printed cover sheets (perhaps with hand, typed or fill-in matrix entries); labels affixed to the cover sheet with the "bar-code"; a code sent via the touch tone keypad; a code sent by the FAX machine; or by knowledge of the caller's phone number (which is now available in parts of the US).

To Query from a Public FAX Station:

Once access has been established, any credit/bank card holder or Public FAX subscriber can query on the status of any messages sent or if any messages are waiting.

FUTURE COMMERCIAL EMBODIMENTS

While the above embodiments could be implemented immediately, others would require that techniques, which are now only laboratory-ready, be made available on a high-volume, low-cost basis, or that existing commercial communications standards be upgraded.

One future commercial embodiment would employ adaptable OCR and Artificial Intelligence (AI), which are now demonstrable on laboratory oriented large computer systems, to implement arbitrary-format and context-independent extraction of routing information. Such a system would incorporate a number of hardware/software modules, organized into a functional system. It is depicted in Figure 2 and is described below:

1. Compressed format digital signals (105) are decoded (110) into standard raster image format (115), as implemented in standard FAXs and PC-FAX boards.

2. An Artificially Intelligent format extraction module (120) would analyze the document image and identify various sections (125) as being: printed (further identifying characteristics such as type face, type size, justification mode, etc.); machine-readable (e.g., bar-code, fill-in matrix, etc., and further identifying the particular standard and version being used); handwriting (e.g., freehand printed, guide-box printed, cursive, signature); and graphic (such as hand sketch or computer generated graphic).

3. For each section identified above, the appropriate Optical Character Recognition (OCR) or other graphic decoding module (130) would be called up for detailed analysis and conversion of the document image section to a machine-understandable, digital code such as ASCII (135).

4. Another AI module (140) would then analyze the digital decoded information for context-dependent content extraction. In particular this module would attempt to identify for whom the document is intended (145), from a machine-readable source, if possible, or from

a printed or even a handwritten source, if not. These three software modules will not necessarily act in a linear fashion, but feedback (170) and adjustment between these modules will improve the accuracy of each.

5. Once an accurate or "best guess" determination of destination were made (with best guesses passed before a human supervisor, perhaps) a directory module (150) would look up the exact or closest match among entries in an employee or customer list (155). Again, if an exact match could not be made, feedback (170) with the previous modules could zero-in on a particular consignee. For example, by checking phone numbers contained in the document against the phone numbers or addresses of the several entries with names that are close matches.

6. Once a destination determination of adequate confidence were made, the FAX image would be digitally tagged (160, 165) and delivered to the appropriate account. If an adequate level of confidence could not be reached, the file would be placed in an "undeliverable" account for review by a human operator.

Other, future commercial embodiments would require the modification or upgrading of FAX machine transmission standards. Such standards are periodically upgraded, with newer machines usually able to communicate with previous versions as well. As explained above, machine-readable graphic information can be incorporated into the image of a FAX by typewriting, computer printing, perhaps handwriting and by PC-FAX boards. It is intended to be within the scope of the present invention that, when the current FAX standard is upgraded, that the capability to append such bar-code, character matrix, standardized DESTINATION box, or other standardized graphic containing addressee routing information, be incorporated into that new standard.

Alternately, as long as the standard is open to re-definition, it would

also be possible to include digitally encoded, directly machine-readable addressee routing information, either before or after the transmission of the FAX image itself. Currently digital information identifying the sender (his phone number, for example), is sent. However, such additional destination information would be meaningless to systems operating under older standards. Such is also intended to be within the scope of the instant invention.

In either of the two instances described above, the addressee routing information would have to be entered into the FAX machine, most likely by some sort of typewriter-like keyboard, before (or after or during) the scanning of the paper document.

Ordinary FAX machines employing such a standard could also have computer software incorporated into them to interpret any of the graphic or digital schemes described above. However, such information will be less useful when employed with a single printing FAX receiver, as opposed to a computer network which comprises one or more PC-FAX boards and a number of possible recipients.

It will thus be seen that the objects set forth above, among those made apparent from the proceeding description, are efficiently attained and certain changes may be made in carrying out the above method and in the construction set forth. Accordingly, it is intended that all matter contained in the above description or shown in the accompanying figures shal be interpreted as illustrative and not in a limiting sense.

Now the the invention has been described, what is claimed as new and desired to be secured by Letters Patent is:

1. A method for routing FAX image transmissions through a communications network by incorporating into the FAX document image information a machine-readable graphic comprising identification routing information.

2. A method as in claim 1, wherein said machine-readable graphic is a bar code.

3. A method as in claim 1, wherein said machine-readable graphic is a fill-in matrix.

4. A method as in claim 1, wherein said machine-readable graphic comprises OCR-suitable typing.

5. A method as in claim 1, wherein said machine-readable graphic comprises OCR-suitable writing.

6. A method as in claim 1, wherein said machine-readable graphic is incorporated into a return-cover sheet.

7. A method as in claim 1, wherein said machine-readable graphic is computer generated.

8. A method as in claim 7, wherein said machine-readable graphic is derived from a computer controlled printer.

9. A method as in claim 1, wherein said machine-readable graphic is derived from a printed label affixed to said cover sheet.

10. A method as in claim 1, wherein said machine-readable graphic is derived from a graphic on a business card, letterhead, or other pre-printed document.

11. A method as in claim 1, wherein said machine-readable graphic is readable by the intended reading machine independent of the position or orientation of said machine-readable graphic.

12. A method as in claim 1, wherein said machine-readable graphic is readable by the intended reading machine only with the proper position or orientation of said machine-readable graphic.

13. A scanning FAX machine that comprises, in addition to standard FAX transmission mechanisms, means to incorporate a machine-readable graphic into the FAX image, said machine-readable graphic comprising identification routing information.

14. A scanning FAX machine that comprises, in addition to standard FAX transmission mechanisms, means to incorporate machine-usable non-graphic digital information into the transmission, said machine-usable digital information comprising identification routing information.

15. A scanning FAX machine as in claim 14, wherein said machine-usable non-graphic digital information is derived from a telephone dial/keypad.

16. A scanning FAX machine as in claim 14, wherein said machine-usable non-graphic digital information is derived from a signal comprising the telephone number of the dial/keypad.

17. A system for routing FAX transmissions comprising:

a. decoding means to decode an encoded document FAX transmission into a document image in raster format;

b. format analysis means, connected to the output of said decoding means, to analyze the document raster image and identify and type at least one image section, and producing a sectioned document image;

c. at least one graphic decoding/conversion means, each keyed to a particular type of document image section, connected to the output of said format analysis means, to decode at least one document image section and convert its content to a machine-usable coded document sections;

d. context-dependent content extraction means, connected to the output of the graphic decoding/conversion means, that will analyze one or more machine-usable coded document sections to identify and extract document/recipient information;

e. recipient directory means, connected to the output of said context-dependent content extraction means, for searching and matching said document/recipient information to an intended recipient location for the FAX transmission; and

f. route tagging means, connected to the output of said recipient directory means, for placing a machine-usable routing tag onto said FAX transmission.

18. A system as in claim 17, comprising in addition:

g. information feedback means, connecting the outputs of at least one means to the input of at least one previous means, to feedback partially processed information into the input of at least one means for further processing.

19. A Public FAX system incorporating a controlling microcomputer, document scanner, document printer, credit card reader, display, user input means and communication line, of standard construction, and further comprising:

means for incorporating a machine-readable graphic comprising identification/routing information into the fax transmission to enable the use of an automated routing return cover sheet.

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Document ID Number: 9965443305

:: ANOTHER DOCUMENT DELIVERED BY MAX-FAX™ BROADCAST FAX NETWORK ::

COVER SHEET

FROM: I. M. Sender

TO: R. E. Seaver

DATE: June 22, 1989

RE: Patent Disclosure

* PLEASE USE THIS SHEET AS A FIRST COVER WHEN RESPONDING *

* PLEASE USE THIS SHEET AS A FIRST COVER WHEN RESPONDING *

FROM:

TO:

DATE:

RE:

INSTRUCTIONS:

RETURN COVER SHEET

+--+ Please check this box for human intervention. Otherwise, the
: : return FAX will be automatically delivered by computer to
+--+ the original sending party.

FIGURE 1

Document ID Number: 9965443305

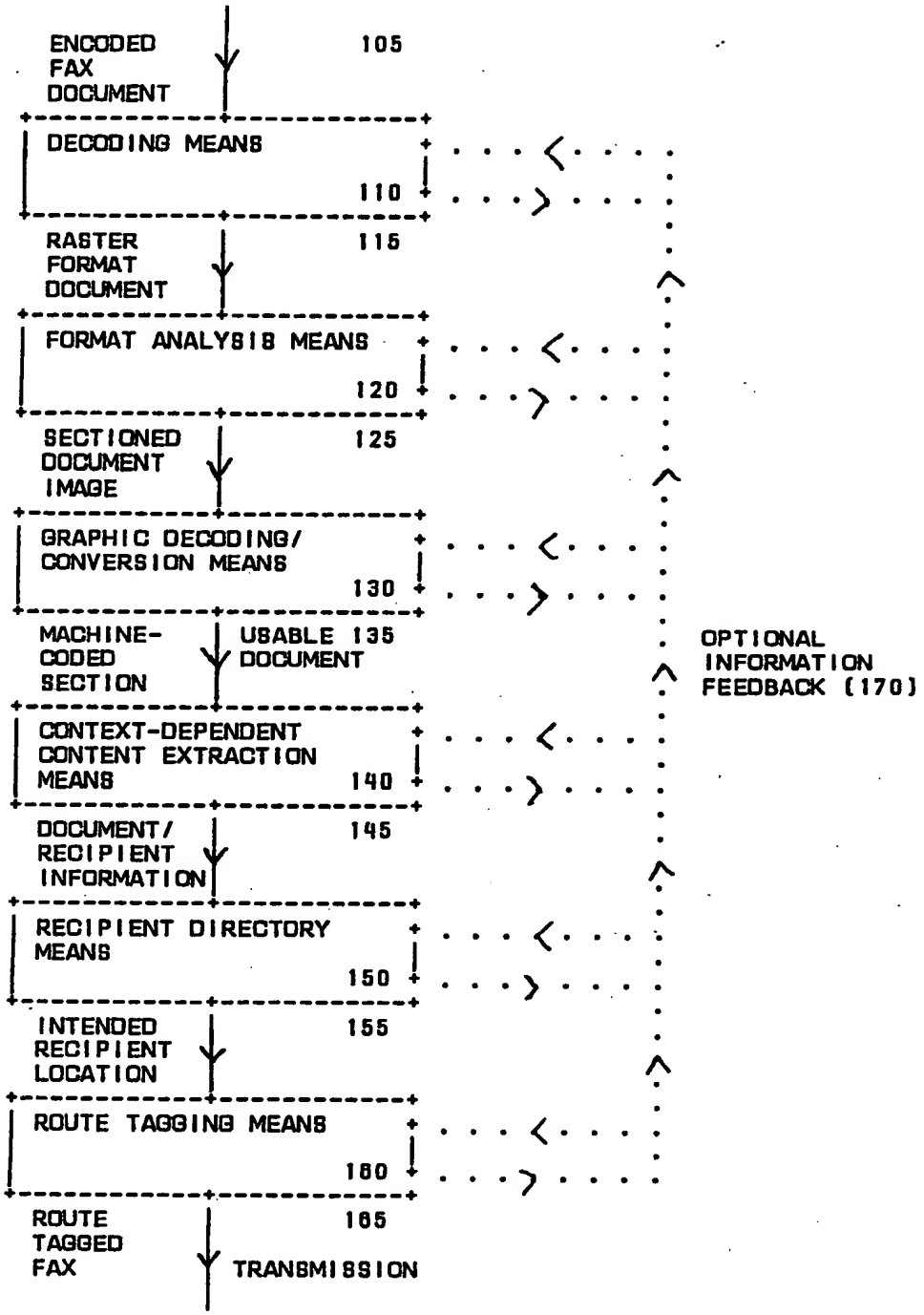

FIGURE 2: FAX TRANSMISSION ROUTING SYSTEM

INTERNATIONAL SEARCH REPORT

International Application No PCT/US90/03988

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

U.S. Cl : 358/440,453,462,476
IPC (5) : H04N 1/00

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U.S.	358/400,401,405,407,446,434,435,438,443,453,462,467,468,470; 382/10,11,12

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category [6]	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X,Y	US,A 4,064,389 (PATTERSON) 20 December 1977 See the entire document.	1,12 & 13; 2-11 & 19
Y	US,A 4,748,317 (SATOH) 31 May 1988 See the entire document.	2
Y	US,A 4,672,461 (YOSHIDA) 09 June 1987 See the entire document.	11
X,Y	US,A 4,811,111 (KUROKAWA) 07 March 1989 See the entire document.	14-16;17-18
Y	US,A 4,733,303 (KOSHIISHI) 22 March 1988 See the entire document.	19

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
10 SEPTEMBER 1990	07 JAN 1991
International Searching Authority [1]	**Signature of Authorized Officer** [20]
ISA/US	JEROME GRANT

Form PCT/ISA/210 (second sheet) (May 1986)